

**610 Pathology Clerkship**  
 Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 12 credits in all enrollments for this course. Interdepartmental with Human Medicine. Administered by College of Human Medicine. R: Open only to graduate-professional students in College of Human Medicine or Osteopathic Medicine. SA: PTH 608  
 Anatomic and clinical pathology with emphasis on clinical-pathological correlation. Conducted in pathology departments of affiliated hospitals.

**620 Directed Studies**  
 Fall, Spring, Summer. 1 to 30 credits. A student may earn a maximum of 48 credits in all enrollments for this course. R: Open only to graduate-professional students in the College of Osteopathic Medicine upon completion of Units I and II. SA: OM 620, OM 620  
 Individual or group work on special problems in medicine.

**651 Obstetrics and Gynecology Clerkship**  
 Fall, Spring, Summer. 1 to 9 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to graduate-professional students in the College of Osteopathic Medicine upon completion of Units I and II. SA: OM 651, OM 651  
 Obstetric patient evaluation and management: motor skills, aptitudes, evaluation of postpartum patient and management of gynecologic problems.

**653 Surgery Clerkship**  
 Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to graduate-professional students in the College of Osteopathic Medicine upon completion of Units I and II. SA: OM 653, OM 653  
 Surgical diagnosis, management, and treatment. Structure developed to achieve proficiency in motor skills, aptitudes, comprehension of concepts and principles, patient evaluation, diagnosis, management, therapy.

**654 Anesthesiology Clerkship**  
 Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to graduate-professional students in the College of Osteopathic Medicine upon completion of Units I and II. SA: OM 654, OM 654  
 Motor skills, concepts and principles, patient evaluation, management and therapy.

**656 Orthopedic Clerkship**  
 Fall, Spring, Summer. 1 to 20 credits. A student may earn a maximum of 30 credits in all enrollments for this course. R: Open only to graduate-professional students in the College of Osteopathic Medicine upon completion of Units I and II. SA: OM 656, OM 656  
 Program developed to achieve proficiency in motor skills, aptitudes, comprehension of concepts and principles, patient evaluation, diagnosis, management, and therapy.

**658 Otorhinolaryngology Clerkship**  
 Fall, Spring, Summer. 1 to 20 credits. A student may earn a maximum of 30 credits in all enrollments for this course. R: Open only to graduate-professional students in the College of Osteopathic Medicine upon completion of Units I and II. SA: OM 658, OM 658  
 Develop proficiency in motor skills, aptitudes, comprehension of concepts and principles, patient evaluation, diagnosis, management, and therapy.

## OSTEOPATHIC SURGICAL SPECIALTIES

### Department of Osteopathic Surgical Specialties College of Osteopathic Medicine

**512 Biostatistics and Epidemiology**  
 Summer. 2(2-0) R: Open only to graduate and graduate-professional students in the Colleges of Osteopathic Medicine, Human Medicine, and Nursing or approval of department. SA: CMS 512, OM 512  
 Medical literature to illustrate statistical reasoning and research design. Emphasis on analysis rather than computation. Prospective or retrospective studies. Sensitivity, specificity, and predictive values. Epidemiologic terminology.

**590 Special Problems**  
 Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 48 credits in all enrollments for this course. R: Open only to graduate-professional students in the College of Osteopathic Medicine. Approval of department. SA: OM 590  
 Each student works under faculty direction on an experimental, theoretical, or applied problem.

**602 Primary Care Ambulatory Clerkship**  
 Fall, Spring, Summer. 1 to 36 credits. A student may earn a maximum of 36 credits in all enrollments for this course. Interdepartmental with Internal Medicine; Osteopathic Medicine; Pediatrics; Psychiatry; Family and Community Medicine. RB: Successful completion of the preclerkship requirements in College of Osteopathic Medicine Units I and II.  
 A 24-week ambulatory care continuity experience involving 12 weeks in a multidisciplinary environment (family medicine, pediatrics, and internal medicine), 4 weeks in family medicine and 8 weeks in specialty areas (internal medicine, surgery, pediatrics, and obstetrics and gynecology). Didactic sessions are scheduled concurrently.

## OFFICE OF THE PROVOST

### Office of the Provost

**101 Freshman Seminar**  
 Fall, Spring. 0 to 1 credits. A student may earn a maximum of 2 credits in all enrollments for this course. R: Open only to freshmen.  
 Introduction to the academic life of the University. Special topics proposed by faculty to engage the interests of new students.

## PACKAGING

### School of Packaging College of Agriculture and Natural Resources

**101 Principles of Packaging**  
 Fall, Spring, Summer. 3(3-0) SA: PKG 210  
 Packaging systems, materials and forms and their relationship to the needs and wants of society.

**221 Packaging with Glass and Metal**  
 Fall, Spring. 3(3-0) P:M: (CEM 141 or CEM 151 or LBS 171) and (PHY 231 or PHY 231B or PHY 231C or PHY 183 or PHY 183A or PHY 183B or PHY 193H or LBS 271) and (PKG 101 or concurrently) SA: PKG 320, PKG 325  
 Physical and chemical properties of glass and metals and their applications to packaging.

**322 Packaging with Paper and Paperboard**  
 Fall, Spring. 4(3-2) P:M: (PKG 221 or concurrently and PKG 101) and (MTH 124 or MTH 132 or LBS 118 or MTH 152H) and (CEM 143 or CEM 251 or CEM 351) and (STT 200 or STT 201 or STT 315 or STT 351) R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging. SA: PKG 325  
 Physical and chemical properties, manufacture, conversion, and use of wood, paper, paperboard, and related components in packaging. Design, use, and evaluation of packages.

**323 Packaging with Plastics**  
 Fall, Spring. 4(3-2) P:M: (PKG 221 or concurrently and PKG 101) and (CEM 143 or CEM 251 or CEM 351) and (STT 200 or STT 201 or STT 315 or STT 351) and (MTH 124 or MTH 132 or LBS 118 or MTH 152H) R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging. SA: PKG 320  
 Physical and chemical properties of plastics and their relationship to selection, design, manufacture, performance, and evaluation of packages.

## Packaging—PKG

- 330 Package Printing**  
Fall. 3(3-0) P:M: (PKG 221) R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging.  
Methods of printing packages including copy preparation, design, electronic imaging, aesthetics, camera use, and effects of package materials. Production of printed packages including quality control, economics, and environmental considerations.
- 370 Packaging and the Environment**  
Spring. 3(3-0) P:M: Completion of Tier I writing requirement. RB: (CEM 141 or CEM 151 or LBS 164) R: Not open to freshmen or sophomores.  
Effects of packaging on environmental quality. Solid waste. Air and water quality. Laws, economics and energy. Resource use and conservation.
- 410 Distribution Packaging Dynamics**  
Fall, Spring. 3(3-0) P:M: (PKG 322 and PKG 323) R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging. SA: PKG 310  
Identification and measurement of hazards in physical distribution. Methods of protection against climate, shock, vibration, and compression.
- 415 Packaging Decision Systems**  
Fall, Spring. 3(2-2) P:M: (MTH 116 or LBS 117 or MTH 114 or MTH 124 or MTH 132 or LBS 118 or MTH 152H) RB: (CSE 101 or CSE 131) R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging.  
Application of computers to analyze and solve problems in the management, specification, production, and testing of packaging systems.
- 432 Packaging Processes**  
Fall, Spring. 4(3-2) P:M: (PKG 322 and PKG 323) and (PHY 232 or PHY 232B or PHY 232C or LBS 272 or PHY 184 or PHY 182B or PHY 184A or PHY 184B or PHY 294H) R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging.  
Integrated study of packaging and production operations, quality control, and organization and control of machines. Interrelationship of products, packaging, machinery layout and efficiency, and quality issues.
- 440 Robotics and Automotive Packaging**  
Fall. 3(3-0) P:M: (MTH 124 or MTH 132 or LBS 118 or MTH 152H)  
Robotic systems: configurations, components, drive mechanisms, control and feedback, safety. Line inspection, vision systems, guided vehicle and storage retrieval systems, reusable and expendable packaging, container cleaning and identification and economics.
- 452 Medical Packaging**  
Fall. 4(3-2) P:M: (PKG 322 or PKG 323)  
Special requirements for packaging pharmaceuticals and medical devices. Evaluation of package systems and packaging procedures.
- 455 Food Packaging**  
Spring. 3(3-1) P:M: (PKG 322 and PKG 323) R: Open only to sophomores or juniors or seniors or graduate students in the Packaging major.  
Food package systems related to specific products and processes. Product composition: problems and packaging solutions, shelf life considerations, and packaging lines.
- 460 Distribution Packaging and Performance Testing**  
Spring. 3(2-2) P:M: (PKG 410) R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging.  
Interrelationships between packaging and distribution systems. Transportation, material handling, warehousing. Logistics and management systems. Performance testing and industry practices. Package container design and testing.
- 475 Packaging Economics**  
Fall. 3(3-0) RB: (EC 201 or EC 202)  
Economic issues in packaging as they relate to policies of the firm and of government. Relationships between economic policy and societal issues.
- 480 Packaging Laws and Regulations**  
Spring. 3(3-0) RB: (PKG 322 or PKG 323) R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging.  
History and development of packaging laws and regulations. Relationships among law, government regulation and commercial regulation. Effect of current laws and regulations on packaging.
- 485 Packaging Development (W)**  
Fall, Spring. 4(4-0) P:M: (PKG 410 and PKG 415 and PKG 432) and completion of Tier I writing requirement. R: Open only to seniors or graduate students in the School of Packaging.  
Package development including selection, design and implementation of package systems for protection, distribution, merchandising, use and disposal.
- 490 Directed Studies in Packaging Problems**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. RB: (PKG 322 and PKG 323) R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging. Approval of department; application required.  
Development of solutions to specific packaging problems. Supervised individual study.
- 491 Special Topics**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course.  
Selected topics of current interest.
- 492 Senior Seminar**  
Fall, Spring. 1(2-0) R: Open only to seniors in Packaging.  
Seminar on current packaging issues, business organization and operations, and accepted practices in a corporate environment.
- 493 Professional Internship in Packaging**  
Fall, Spring, Summer. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (PKG 322 and PKG 323) R: A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CSS 493, EEP 493, FIM 493, FW 493, HRT 493, PKG 493, PLP 493, PRR 493, and RD 493. Approval of school; application required.  
Supervised professional experience in the field of packaging offered through corporations and other businesses throughout the U.S.
- 801 Packaging Materials**  
Fall. 4(4-0) R: Approval of department.  
Physical and chemical properties of packaging materials; design, manufacture, performance and evaluation of packages.
- 802 Packaging Machinery, Distribution, and Dynamics**  
Spring. 4(4-0) P:M: (PKG 801) R: Approval of department.  
Packaging machinery and line operations, statistical process control. Transportation environment. Distribution packaging design and testing.
- 805 Advanced Packaging Dynamics**  
Spring. 3(2-2) RB: (PKG 410)  
Shock and vibration. Distribution hazards and product fragility. Cushion performance and package design. Environmental measurement and simulation.
- 815 Permeability and Shelf Life**  
Spring. 3(2-2) RB: (MTH 124Q and MTH 132 and PKG 322 and PKG 323)  
Relationship between the storage life of packaged food and pharmaceutical products and the gas, moisture, and organic vapor permeability of packages in various environments.
- 817 Instruments for Analysis of Packaging Materials**  
Fall of even years. 4(3-2) RB: (PKG 322 and PKG 323)  
Analytical methods for packaging including spectrophotometry and chromatography. Material identification and characterization. Migration and permeation measurements.
- 827 Polymeric Packaging Materials**  
Fall. 3(3-0) RB: (PKG 323 or PKG 801) SA: PKG 825  
Physical and chemical properties of polymeric materials and structures used in packaging. Relationship of properties to performance.
- 828 Processing and Applications of Packaging Plastics**  
Spring. 3(3-0)  
Processing of packaging plastics: extrusion, coating, film, containers. Effects of processing variables on morphology and performance.
- 829 Packaging Plastics Laboratory**  
Fall. 1(0-2) Not open to students with credit in PKG 825.  
Structure versus property relationships and plastics processing.
- 840 Group Processes**  
Spring of odd years. 3(3-0) RB: 15 credits in the social sciences. R: Open only to graduate students in the Psychology major or approval of department. SA: PSY 842C  
Contemporary theory and research dealing with the individual in a group context.
- 875 Stability and Recyclability of Packaging Materials**  
Fall of odd years. 3(3-0) RB: (PKG 322 and PKG 323)  
Interactions between packaging materials and environments: corrosion, degradation, stabilization, and recycling. Impacts of packaging disposal.
- 888 Master's Project**  
Fall, Spring, Summer. 2 credits. R: Open only to master's students in the School of Packaging. Approval of school, application required.  
Master's degree Plan B project. Completion of a project related to packaging issues.

- 890 Independent Study in Packaging**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to graduate students in Packaging. Approval of department; application required.  
Special investigations of unique packaging problems.
- 891 Selected Topics**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open only to graduate students in Packaging.  
Selected topics of interest to graduate packaging students.
- 899 Master's Thesis Research**  
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to master's students in the Packaging major.  
Master's thesis research.
- 985 Analytical Solutions to Packaging Design**  
Spring of even years. 3(3-0) RB: (PKG 825)  
R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering or College of Natural Science. Approval of department; application required.  
Analytical and quantitative techniques for packaging design and evaluation.
- 990 Independent Study in Packaging**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to Ph.D. students in the School of Packaging. Approval of department; application required.  
Special investigations of unique packaging problems.
- 992 Packaging Seminar**  
Fall. 1(2-0) A student may earn a maximum of 3 credits in all enrollments for this course. R: Open only to graduate students in packaging.  
Presentations of detailed studies on specialized aspects of packaging.
- 999 Doctoral Dissertation Research**  
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 50 credits in all enrollments for this course. R: Open only to Doctoral students in packaging.  
Doctoral dissertation research.

**PARK,  
RECREATION  
AND TOURISM  
RESOURCES**

**PRR**

**Department of Community,  
Agriculture, Recreation and  
Resource Studies  
College of Agriculture and  
Natural Resources**

- 100 Recreation in Michigan Natural Resources**  
Spring. 3(3-0)  
The scope and status of Michigan natural resources used for recreation. Historical and philosophical foundations of management and policy. Analysis of contemporary environmental and recreational policy issues.
- 200 Leisure and Society**  
Fall, Spring, Summer. 3(3-0)  
Leisure and recreation as part of daily life. Leisure as a social, psychological, political, economic and cultural force in the United States.
- 208 Physical Geography of the National Parks**  
Fall of odd years. 2(2-0) Interdepartmental with Geography. Administered by Department of Geography.  
Physical features such as geology, landforms, biota, and waters of United States and Canadian national parks, forests, seashores and lakeshores. Emphasis on formation and distribution.
- 210 Our National Parks and Recreation Lands**  
Fall, Spring, Summer. 3(3-0)  
Scope and history of federal recreation lands. Comparisons of national parks to other federal lands. Recreation land management in other nations. Future federal land management options.
- 213 Introduction to Parks, Recreation, and Leisure**  
Fall, Spring, Summer. 3(3-0)  
The scope and management of recreation services and resources. Historical and philosophical foundations. Influence of recreation behavior on state, national, international, economic, political and social institutions.
- 215 Recreation Program Management**  
Fall, Spring. 4(3-2)  
Programming and leadership principles for planning, management, and evaluation. Program design and conduct to service different clienteles, using leisure education, program development, and small group processes. Field trips required.
- 272 Recreational Boating Systems and the Boating Industry**  
Fall. 3(3-0)  
Boats and boaters, marinas, dealerships, boating agencies and organizations, emerging issues, and management methods. Field trips required.

- 293 Field Work in Park and Recreation Resources**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Approval of department.  
Professional field experience in a park or recreation setting.
- 295 Field Study in Park, Recreation and Tourism Resources Delivery Systems**  
Spring. 2 credits. P:M: (PRR 213 and PRR 215) R: Open only to sophomores or juniors or seniors. Approval of department; application required.  
Field course illustrating public, non-profit, and commercial recreation delivery systems. Interrelationships of recreation with natural resources, cultural resources, facilities, and communities. Partnerships and competition among providers. Field trips required.
- 302 Environmental Attitudes and Concepts**  
Fall. 3(3-0) RB: One ISS course or one PSY course or one SOC course. R: Not open to freshmen.  
History of attitudes and values associated with the environment, wilderness, environmentalism, environmental quality, conservation, and preservation. Perceptions and assessment of modern environmental problems.
- 351 Recreation and Natural Resources Communication (W)**  
Fall, Spring. 3(2-2) P:M: (PRR 213) and completion of Tier I writing requirement. R: Open only to students in the Department of Community, Agriculture, Recreation and Resource Studies. Not open to freshmen.  
Principles of communication for recreation and natural resource audiences. Application to various forms of interpretive media including verbal, graphic, and written. Field trips required.
- 370 Administration and Operation of Park and Recreation Systems**  
Fall. 3(3-0) P:M: (PRR 213 and PRR 215) RB: (PRR 293) R: Not open to freshmen or sophomores.  
Administration, operation and policy of park, recreation and tourism organizations. Legal foundations, concepts and responsibilities, ethical decision-making and personnel management.
- 371 Management of Park and Recreation Agencies and Organizations**  
Spring. 3(3-0) P:M: (PRR 213 and PRR 215) R: Not open to freshmen or sophomores.  
Management concepts and methods. Budgeting, service marketing, and strategic planning in park, recreation and tourism organizations.
- 388 Physical Resource Management in Parks, Recreation and Tourism**  
Fall. 3(2-2) P:M: (PRR 213 and PRR 215) RB: (PRR 293) R: Open only to sophomores or juniors or seniors.  
Relationships among natural resources, the environment, recreational use and site design and development. Principles to safeguard, maintain and restore recreation environments.